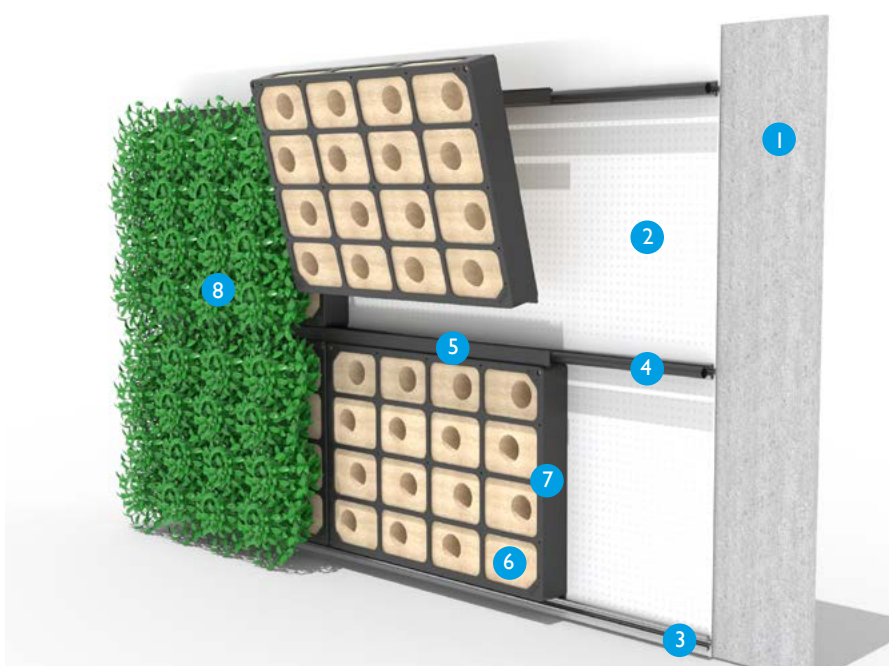
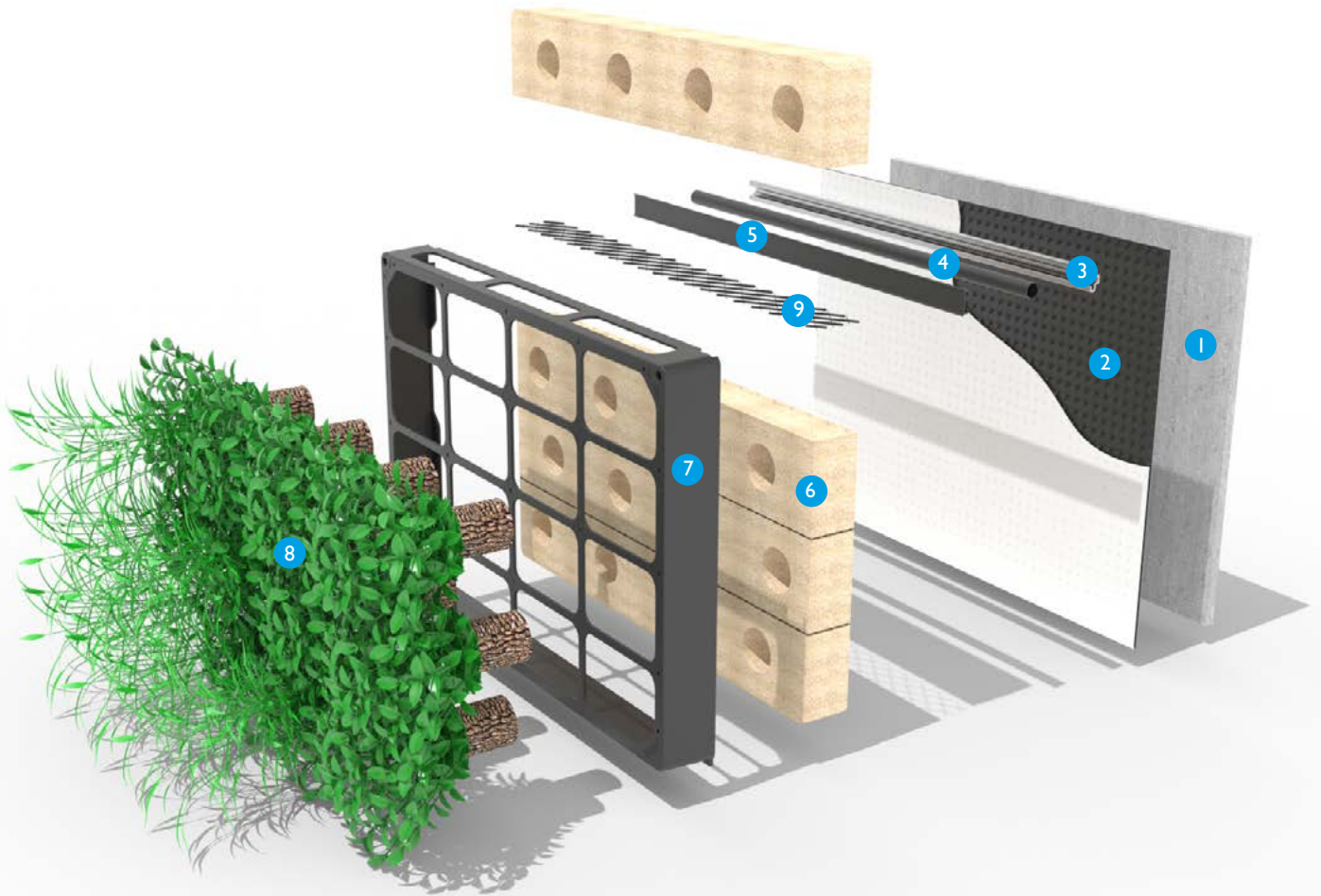




# BIOTECHTURE BIOPANEL EXTERNAL LIVING WALL SYSTEM OUTLINE SPECIFICATION



- 1 A or B rated 12mm water resistant cement particle backing board
- 2 Geotextile drainage layer
- 3 Aluminium carrier rail
- 4 16mm polypropylene irrigation pipeline
- 5 Polypropylene irrigation cover
- 6 Growing medium - Grodan PP/100/100
- 7 Recycled polypropylene shell
- 8 Robust evergreen planting
- 9 Capillary breaks

## **1.0 General description:**

Fully comprehensive, irrigated living wall system made up of 'backless' modular panels, containing an inorganic growing medium surrounded by a recycled polypropylene or aluminium shell. Panels are mounted to a waterproof backing board through a void former drainage layer and held in place by aluminium carrier rails.

## **2.0 Support structure:**

Support structure to provide maximum 600mm fixing positions horizontally, 300mm vertically and 150mm centres to the perimeter of the wall in exposed locations

Support structure will vary from project to project but will be typically a Hilti helping hand system, Omega top hat system or bespoke galvanised steel box sections.

## **3.0 Living wall system**

### **3.1 Waterproof backing board**

Durable water-resistant board 12mm thickness – Versapanel Eco sheet or similar fixed to the support structure.

### **3.2 Rear drainage layer (void former)**

Geocomposite drainage layer comprising a high-performance single cusped HDPE (High density polyethylene) core with a geotextile filter thermally bonded to one side to provide a drainage layer to the rear of the panel and a waterproof layer in front of the backing board.

### **3.3 Carrier rail**

'T' profile rail carrier system to carry the BioPanels

### **3.4 BioPanel (BioTile in international markets)**

Injection moulded recycled polypropylene shell to support the growing medium. Standard panel module dimension 600mm wide x 450mm

### **3.5 Growing medium**

Inorganic, chemically inert and dimensionally stable growing medium with a nominal dry density of 16.8kg/m<sup>3</sup>.

Material 'stonewool' – high alumina, low silica wool product reference Grodan PP 100/100.

4 strips of Grodan per standard panel with a capillary break between each section

Each Panel to have 16, 50-65mm diameter planting holes (4 per Grodan strip)

Capillary breaks - Geocomposite drainage layer formed using extruded high-density polyethylene (HDPE) net drainage core with non-woven polypropylene (PP) geotextile filter/ separator bonded to one side and an extruded (PE/EVA) geomembrane bonded to the other.

## **4.0 Planting**

### **4.1 Planting density**

Plant spacing to be 60 plants per sq m

### **4.2 Plant species**

All plants to be selected from the Biotecture plant database to suit the local climatic conditions, including aspect, wind conditions and shade.

Plant species to be included in the living wall to be included as a series of plant matrices to create an overall planting pattern presented for sign off by the client prior to plant orders and planting in the nursery.

Planting design to be based on client design discussions and the selection of species to suit the local climatic conditions.

Plants are to be planted into the Biotecture BioPanel panels a minimum of twelve weeks prior to installation.

The twelve-week period must be sometime between March and November.

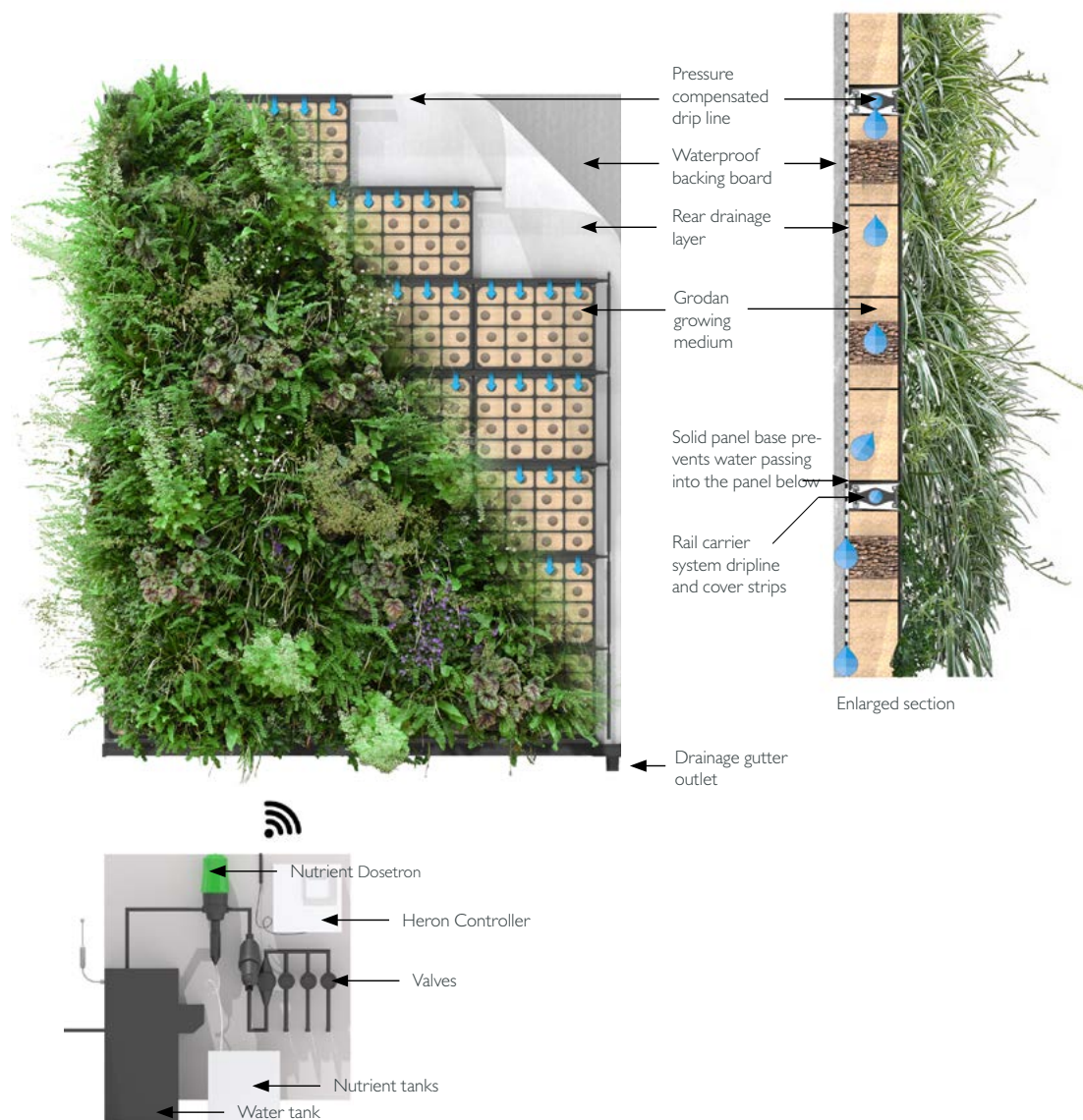
## 5.0 Integrated Irrigation

Pumping is to be via a reliable pump set capable of delivering the correct pressure at all drip locations.

Water is to be distributed from the pump through zoned solenoid valves via a ring main and header pipes with control being via a remote sensing computer controller.

System is to include a fail-safe pump start relay.

Irrigation water is to be precisely applied via irrigation driplines of no less than 16mm diameter. The drippers are to be in-line, self-flushing and self-cleaning pressure compensated drippers each operating at minimum of 1.6 litres per hour. The system will include the ability for each dripline to be easily flushed on a regular basis.



## 5.2 Break tank

WRAS approved high density polyethylene break tank with integral submersible pump.

## 5.3 Irrigation fittings

Wall/array fittings all barbed, Couplers, elbows and T pieces with non-return valves if required, to suit the installation

## 5.4 Water feed pipework and irrigation pipework

20/25mm LDPE water feed pipe (pipe diameter varies according to the distance between the plant and the living wall)  
Irrigation pipework – 20mm HDPE hose with barbed fittings.

## 5.6 Dripline

Polypropylene round dripline, 16mm diameter, with flat pressure compensating drippers (4 drippers per standard BioPanel) giving dripper flow rate of not less than 1.6 l/h. Dripline fixed to the carrier rails using proprietary injection moulded polypropylene clips. Self coloured aluminium cover strip cover strip to provide improved visual appearance, solar protection and fire barrier.

## 5.7 Irrigation controls

Multi wire controller to operate the solenoid valves. Manufacturer: Heron or similar approved

The controller will be programmed with flow-rate parameters for each zone and will be set to monitor the flow-rate at prescribed intervals (usually 30 seconds). It will also be set with a deviation percentage. When the controller monitors a flow-rate that deviates from the expected flow rate by more than the input deviation percentage it responds by, firstly shutting off the pump and secondly sending an alert by email.

GPRS signal or LAN connection required in order for the controller to communicate with remotely with the Biotecture server.

## 6.0 Fertigation

Nutrients are to be added to the water flow by means of a Dosatron or similar impeller device. Essential macro and micro nutrients added at a rate of between 0.2% and 0.5% by volume. The nutrient mix is to be as prescribed by Biotecture. Nutrients are to be stored in a separate tank and fully integrated with the irrigation system

## 7.0 Drainage

114mm wide plastic gutter to be installed at the base of the living wall to collect run off with 32mm outlet. Drainage connection by others to discharge to either the foul water or surface water drainage system

[Alternative gutter]

Pressed aluminium gutter 90x60x120mm with powder coat paint finish to agreed RAL colour with 32mm outlet. Drainage connection by others to discharge to either the foul water or surface water drainage system.

## 8.0 Services

### 8.1 Mechanical and electrical services to the plant room

The following mechanical and electrical services are to be provided to the plant room by others:

	Location	Requirement
Mains water into plant room	Plant room	2-3 bar pressure
Drainage at irrigation rig for overflow	Plant room	50mm min
Electrical supply for irrigation rig	Plant room	13Amp single phase socket

Additional services required if rainwater harvesting is included:

	Location	Requirement
Rainwater feed into rainwater tanks	Plant room	TBC - location specific
Electrical supply to mains water top up controller	Plant room	13Amp single phase socket

### 8.2 Mains water

Mains water to be provided by others and to the following standard:

- The Water Supply (Water Quality) Regulations 2000] and the Drinking Water Inspectorate - 2000 No. 3184
- The Water Supply Regulations 2010 - 2010 No. 991

Water supplied from other sources (Rainwater Harvesting, Wells, Rivers, Boreholes, Ponds) to be to the following standard:

1. Allowable pH range – the limit is pH 5 to pH 8
2. Particle size – maximum particle size entering Biotechture irrigation system should be 120 microns (typical standard would be 400 microns)
3. All other chemicals to meet drinking water standards

### 8.3 Services outside the plant room

Following services to be provided outside the plantroom - by others

Irrigation pipes	Number to be confirmed	20/25mm LDPE pipe	To be free issue by Biotechture - pipe runs by the main contractor
Drainage route from the living wall		100mm diameter - max size	Drainage connections from the gutter at the base of the living wall to either the foul or surface water systems
Aerial wire	If required	5mm approx.	Free issue by Biotechture - install by the main contractor

## 9.0 Riser covers, copings and window surrounds

**9.1** Twice bent 2mm pressed aluminium to agreed RAL colour. Located top and sides of the planted panels inclusive of window head and reveals to max 1,500mm centres using pre-painted head to RAL colour to match flashing / cover strip

### 10.0 Maintenance

- The living wall is to be designed and assembled to enable safe and easy access for cleaning, maintenance and parts exchange.
- Wherever possible maintenance tasks shall be designed and engineered to be conducted from ground level
- Wherever possible natural biological controls are to be used
- Routine should be to replace individual plants rather than replacing whole panels
- Individual panels can be replaced as required

### 10.2 Key performance indicators

- Irrigation system function = the times when it should function
- Visual aspect of wall = minimum 90% wall coverage by alive plants at all times
- The actual irrigation flow rate is within 20% of the design flow rates at all times
- Water consumption requirements = a maximum fresh water consumption of 2 litres per m<sup>2</sup> per day as an annual average
- Wastewater = a maximum waste water discharge of 0.2 litres per m<sup>2</sup> as an annual average

### 11.0 Fire

See the IFC Group Engineering Assessment Report Reference PAR /16691/01

Following the fire testing by BRE the IFC report concluded:

'Based upon the fire testing conducted and described in Section 3, it is the opinion of IFC that if the Biotecture Ltd Living Wall system was manufactured, installed and maintained in accordance with the requirements of this engineering Assessment Report, then the following reaction to fire performance would likely be achieved: B-s3,d2

### 12.0 Structure

See the Evolve report 'Structural Engineering Assessment of Biotecture Living Wall System rev A dated 4th October 2017

### 13.0 Lighting

See the Biotecture lighting design guide